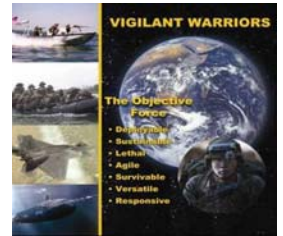


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Unified Quest 03

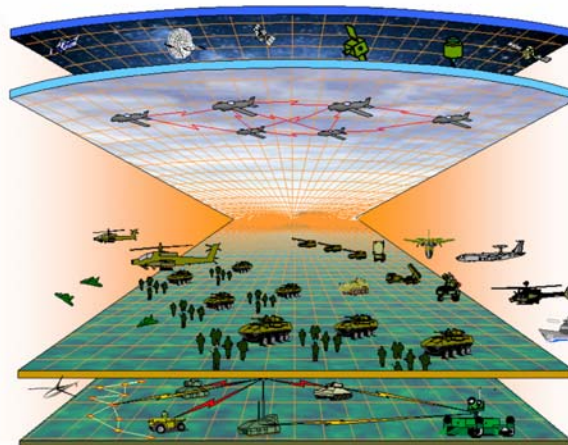


US ARMY

ARMY.COM

***2015 Communications/ Information
Architecture & Key Systems***

TOOL BOX



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C4

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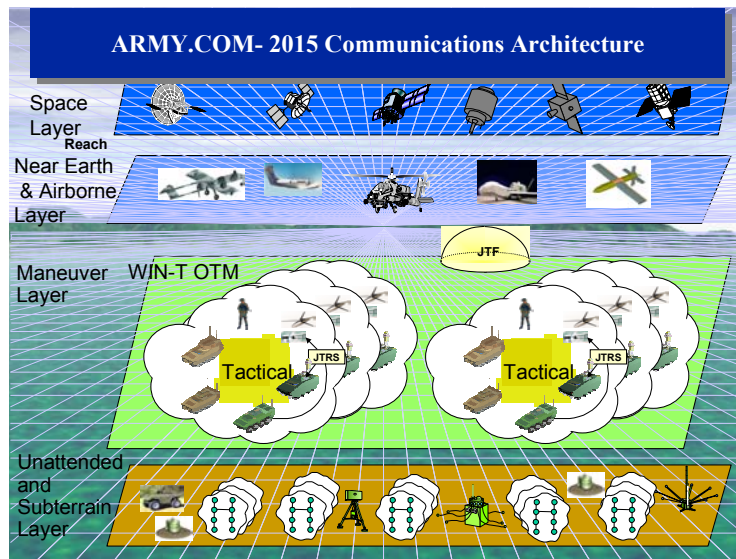
MIST (Multi-band Satellite Terminal) Ground Terminal

SMART-T Ground Terminals

Embedded JTRS SOTM (SATCOM On-Move Terminal)

Handheld JTRS

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Section A: ARMY.COM- 2015 ARCHITECTURE VISION

1. Why an Ubiquitous Network: Army.com represents a profound change in how the Army currently thinks about C4. In the early 2000s, the Army deployed and established its Command, Control, Communications, and Computers (C4) systems in the form of hardware, software and soldiers front-loaded in contingency deployments. Army.com promises an integrated C4 system traveling through the time and place with embedded devices within the deploying force. Since the military forces traded armor skin for information, Networked C4 is the key to achieving this vision. Never before has the network played such a crucial role in helping to redefine a fighting Force. Army.com is a living network that organizes and heals itself and allows the Signal unit to concentrate on managing information and the network. It gives anyone, who has the need to know, the ability to electronically find anyone from anywhere, plug and play anywhere, and universal access to Army knowledge. This technology supports a lighter, lethal, and survivable and deployable force capable of quick response across the globe. Attributes of Army.com are as follows:

- Enables Global Strike
- Reduces or eliminates the need for an "on the ground" C4 footprint UA and below.
- Establishes and maintains a continuous space-based backbone, providing a robust and relatively safe system.
- Transitions the soldier to both an intelligence collecting sensor and an integrated combat system bringing him the World Wide Web like internet capabilities.
- Provides seamless integration into joint and combined C4 systems with an adaptive and self-organizing system.
- Provides a mechanism to share a common operating picture that can be tailored for relevance by the soldier, maneuver unit, joint force and combatant command level.

** Layers are discussed on next slide

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SECTION A: continued

2. Layer Concept: Figure above depicts our top-level network centric vision of one ubiquitous network (or network of networks) for 2015. This architecture supports the "Always-on" Airborne and Space communications constellations and is always available for forces around the globe. All of the layers will be interconnected into one overarching network utilizing military, government, and commercial assets. Key elements are identified using a layer approach and further discussed below:

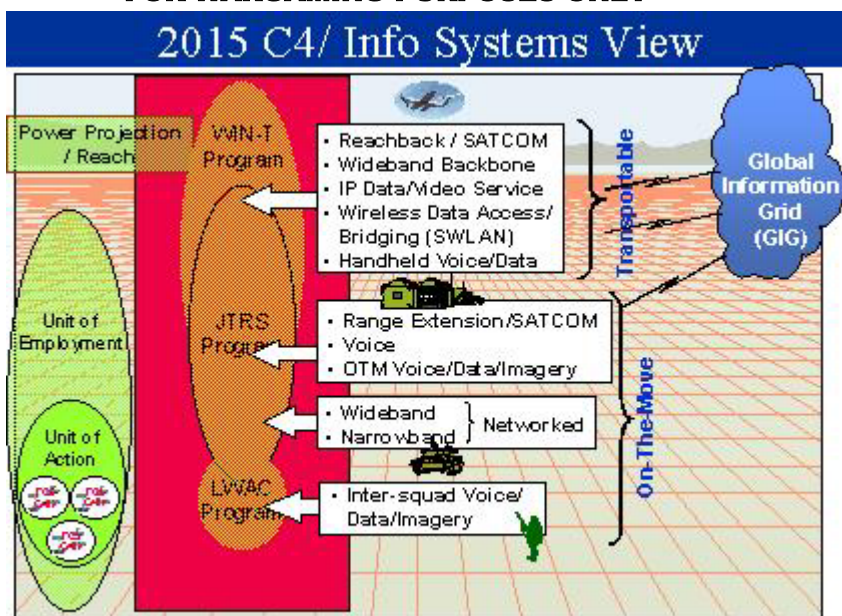
Unattended and Sub terrain Layer: A new layer of the battlespace has emerged, due to the advances in intelligent agent software, ability to miniaturize electronics, and ability to quickly burrow beneath the earth's surface. This layer addresses unattended sensors and communications networks including at and below ground Robotic platforms (unattended sensor networks, unattended mines, and other low profile robotic platforms) are designed to operate autonomously or remotely and have an embedded C4 device (JTRS Cluster 5 discussed in section C). Our Special Forces also have missions that take them below the ground surface. SOF sub-surface battlefield consists of pre-hostility mapping, rapid on-site missions, and penetration of sub-level facilities. This layer also includes the Commercial Fiber Optics and Cable Networks.

Maneuver Layer: is the primary mobile network containing both Tactical (owned and operated by the Military) and Commercial Terrestrial Networks. Tactical is made up of all the communications suites on all platforms (for details on individual system descriptions refer to section C). All are capable of transmitting and receiving, managing the device spectrum, and acting as relays and routers. Emergency assets are the Small and Micro UAVs which can be used as relays to fill in network holes. This layer contains all warfighter systems/ platforms; dismounted, ground vehicles, and airborne assets at altitudes of up to 20,000 ft. Tactical UAVs and Relay MULES provide the range extension for maneuver assets.

Near Earth and Airborne Layer: Any asset flying at altitudes of 20-120,000 feet is considered part of the Airborne Layer and anything flying below 20,000 feet is considered part of the Maneuver Layer. The Airborne Layer provides the range and network extension, and immediate connectivity within the AO for continuous communications services for non-combat platforms. High Altitude Platforms can take the burden off of the satellites and provide faster communications services within its footprint.

Space Layer: For most deployments, the near-space layer can provide the back-bone for the terrestrial user community. Space layer assets are military, government, and commercial low earth orbit (LEO), medium earth orbit (MEO), and geostationary Earth orbit (GEO) satellites. National (DoD J6 Transformal Communications Architecture) space assets are in place. The commercial systems are not described in this document. Commercial assets at all levels are for lease. For the purposes of this wargame, there are no deep space assets. Space layer is extremely useful during Mobilization/ Planning and Early Entry Phases of an operation/ mission.

****note-** Individual technologies and systems, such as NETOPS (Network Management, Information Assurance, and Information Dissemination) will be discussed in the Systems View, Section B.



SECTION B: 2015 ARCHITECTURE SYSTEM VIEW

1. Overall. The framework that cuts across the layers discussed in section A. It consists of an environment populated by several systems each contributing to the effectiveness of the overall architecture. These include the GIG, NETOPS, WIN-T, JTRS, and Land Warrior Advanced Capability. These enable the architecture to provide information services to the warfighter at any point in the mission and battlespace. As you can see by the orange oval icons, they overlap each other to provide seamless connectivity between the systems. Embedded information network provides services to anyone whether static or on-the-move and across the globe. This provides anyone, within the network, the ability to see, understand, act first, and then finish decisively. Commanders can synchronize all elements of combat power in real-time to shape, close with and destroy/ control the enemy. Networked force is optimized for mobile operations, able to expand and contract with the fight, through dynamic, extended range, self-organizing and multi-layered communications. Force is compatible with Legacy, Interim, Joint and Coalition C4 systems. This non-linear battlefield is IP/ Packet-Switched Base, JTRS Compliant, assured network access, and teleport is integral to the Architecture.

2. Land Warrior Advanced Capability. The Land Warrior Advanced Capability converts the infantryman into a complete weapons platform. Land Warrior combines several subsystems in one wearable device for the dismounted soldier: the weapon, integrated helmet assembly, protective clothing and individual equipment, and C4 (computer/radio and software). The C4 consists of communications, navigation, and situation awareness for the warrior; including terrain radio, applications, continuous position/ navigation and targeting, distributed information management and autonomous adaptive networking. For C4 range extensions, Land Warrior will be equipped with robotic mules and unmanned aerial vehicles.

3. JTRS. The Joint Tactical Radio System (JTRS) lays the foundation for achieving network connectivity across the radio frequency (RF) spectrum providing for digital information exchanges, both vertically and horizontally, between Joint warfighting elements. It also provides connectivity to civil and national authorities. The JTRS combines the functionality of numerous single function radios among the services into a single Joint-Interoperable family of radios (clusters 1-5). The JTR System satisfies requirements common to the three domains (ground, airborne, and maritime). It provides a family of tactical radios sets including routers, switches, and other networking components/ functions to meet the needs of the environment. The radios sets are software-reprogrammable, multi-band/ multi-mode capable, networkable between radios, and provide simultaneous voice, data, and video communications. JTRS provides growth capability through an open system architecture that enables technology insertion through evolutionary acquisition. The JTR System is capable of high data throughput rates per channel; incremental channel expansion; high levels of reliability, availability, and maintainability; technological enhancement; and commercial support service compatibility.

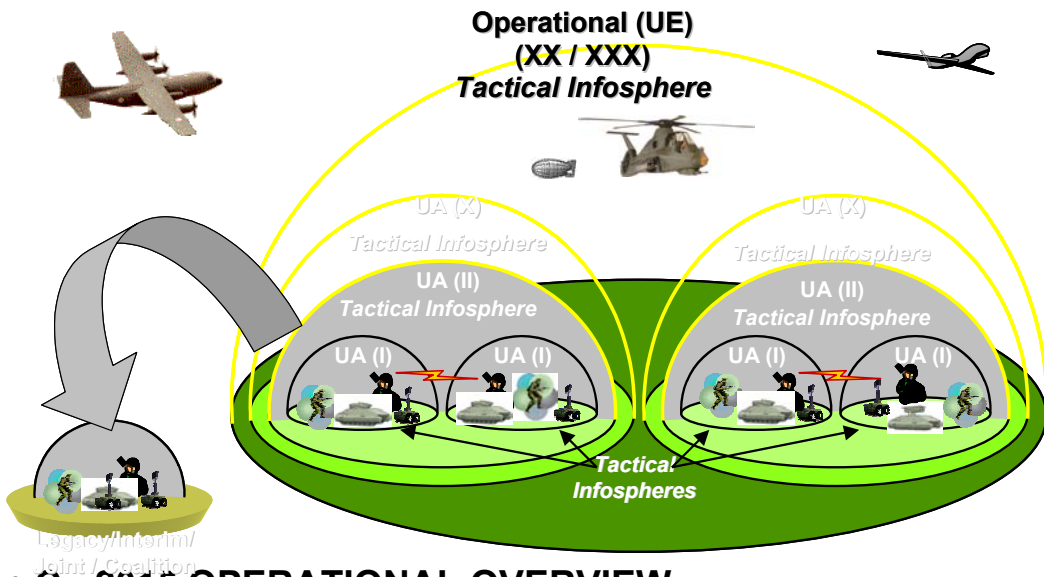
SECTION B: continued

4. WIN-T. Warfighter Information Network-Tactical (WIN-T) is the Army's single integrating framework comprised of commercially-based satellite communications providing networked communications systems. WIN-T is the glue that holds together the strategic C4 systems and the army's disparate C4 systems into one contiguous architecture. It is the high-speed and high capacity backbone communications network. It will be focused on moving information in a manner that supports commanders, staffs, functional units, and capabilities-based formations – all mobile, agile, lethal, sustainable, and deployable. WIN-T exploits state-of-the-art communications, terrestrial, airborne and space-based assets, computing systems and capabilities to provide the Army with the technical advantage.

- It provides increased network capacity and speed; integrated information systems, security and services; and sustainable base for mobile users/sensors.
- Interfaces with legacy, interim and enables future systems.
- Capabilities include linking CONUS installation to battlefield units via SATCOM, Beyond Line of Sight (BLOS) communications, and information systems.
- It provides the framework for establishing standards and protocols for future forces.

5. NETOPS. Is an operating process that facilitates information superiority through Network Management, Information Assurance, and Information Dissemination Management capabilities. It provides information delivery and protection via one Common Operating Picture (COP) under the management of the Signal Soldier. NETOPS provides a bridge for GIG capabilities into the Army. These become more critical in 2015 where the communicator monitors and manages the information system. In the future, operational networks will be self-forming, self-configuring and self-healing. The NETOPS manager concentrates on information flow vice maintenance of links and routes.

6. GIG. The Global Information Grid (GIG) supports all DoD missions with information technology, for joint operations, joint and combined operations at the operational level. DoD Chief Information Officer is responsible to establish GIG compliance and enforcement mechanisms. GIG is globally interconnected using all DoD owned and leased communications and computing systems and services, software, data, security services, and other associated services necessary to achieve Information Superiority. It offers the most effective, efficient, and assured information handling capabilities available, consistent with national military strategy, and operational requirement. It is based on an enterprise-level, communications, and computing architecture to provide a full range of information services at all major security classifications and information handling caveats consistent with NSTISSP No 11. Key GIG components include information transport, network management, information assurance and support of IDM data exchanges throughout the battlespace. It provides capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms, deployed sites, coalition, allied and non-DoD users and systems). GIG includes any system, equipment, software, or service that transmits and receives information, provides retention and data/knowledge services, and processes data or information. The GIG will not be discussed in further detail and systems will not be included in this C4 section C.

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Section C: 2015 OPERATIONAL OVERVIEW

1. Echelon Domes Overview: This architecture represents a profound change in how the Army currently thinks about C4. In the early 2000s, the Army deployed and established its Command, Control, Communications, and Computers (C4) systems in the form of hardware, software and soldiers front-loaded in contingency deployments. Army.com promises an integrated C4 system traveling through the time and place with embedded devices in the deploying force. It gives anyone in the network the ability to electronically find anyone from anywhere, plug and play anywhere, and universal access to Army knowledge. This technology supports a lighter, lethal, and survivable and deployable force capable of quick response across the globe. Reduces or eliminates the need for an "on the ground" C4 footprint UA and below. Provides a mechanism to share a common operating picture that can be tailored for relevance by the soldier, maneuver unit, joint force and combatant command level. Each echelon; Unit of Employment (UE), Unit of Action (UA), and etc. are responsible for providing C4 within their own dome area. At present, the framework prescribes two basic groups of echelons — the Unit of Action (UA) and the Unit of Employment (UE). These comprise an organizational framework developed to help the Army explore the complex questions of echelonment, task/purpose, command and control (C2), and mission tailoring in the future force.

2. Unit of Employment (UE): At the Unit of Employment (UE), will provide command centers and staff elements with the communications capabilities to link to adjacent Units of Employment, subordinate UAs, sustaining base, Joint, Allied and Coalition forces. The UE will consist of Units of Action (e.g. brigade/battalion size element) as an integral part of it's warfighting mission that are specialized for rapid mission tailoring UEs (e.g. Netfires, Maneuver Support, Civil Affairs, Air Missile Defense, Special Operations, Aviation, Psychological Operations (PSYOPS), Fires and Effects, Artillery). In contrast, UEs are highly tailorable, higher-level echelons that integrate and synchronize Army forces for full spectrum operations at the higher tactical and operational levels of war/conflict. Focused on major operations and decisive land campaigns in support of joint operational and strategic objectives, units of employment participate in all phases of joint operations from initial entry to conflict termination in any form of conflict and operating environment. The UE is capable of command and control of all Army, joint, and multinational forces. It will be organized, designed, and equipped to fulfill command and control (C2) functions as the Army Forces (ARFOR) Component, Joint Force Land Component Command (JFLCC), or the Joint Task Force (JTF). The UE provides ISR communications and sustainment capabilities necessary to support the early entry command missions that enable the UA to conduct decisive operations without the traditional Reception, Staging, Onward movement and Integration (RSOI). The UE must ensure the integration of the UA elements into the

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Section B: 2015 OPERATIONAL OVERVIEW

2. UE cont'. Theater of Operations (TOO) by providing access to the Global Information Grid (GIG) (e.g. reach to Joint, Strategic and Coalition ISR information), integrating operational and tactical links, streaming sensor-to-shooter data, as well as providing the deploying units integrated logistics support through reach to intermediate and sustaining base logistics centers. UE will push/pull combat information (e.g. friendly, enemy, terrain, weather and non-combatants) to the UA in order to support the commanders and their staffs in planning, decision making, engagement, Intelligence Electronic Warfare (IEW), and sustainment. The UE will provide internal and external sensor fusion and data streaming (e.g. Joint and National Assets) to support the UA leaders as they conduct continuous situation development and engagements while on the move. Communication elements supporting these entities must have the same mobility as the unit that it supports.

3. Unit of Action (UA): UAs are, to a large extent, units with a fixed organizational structure that accomplish discrete sets of functions at the tactical level in accordance with prescribed mission-essential tasks. UAs are further designed as modular organizations that can be combined and integrated as the basic building blocks of combined arms combat power to form larger formations. Represented today by the echelons of section through brigade, units of action will vary in size and number of organic sub-units, dependent on the battlefield functions performed by the unit and its organic capabilities. The UA requires a highly mobile, transparent communications network capable of delivering the right information at the right time in the right format to the right place in support of the warfighting commander and other elements, supporting varying tasks/purpose, for UA elements across the domains and echelons. Critical to the integration of information and execution of decisive operations is the tactical dome. The tactical dome is the layered, integrated network of information and communications capabilities required to support effective tactical operations within the UE and UA. Fully networked communications with access to the GIG at the lowest tactical levels, enables access to real-time situational awareness and targeting with connectivity to Joint, Theater, Coalition, and National sources. Further, UA platforms must have the capability to reach to sustaining base and higher mission-oriented headquarters for relevant and timely status reporting on mission, sustainment and personnel data, and unique applications (e.g. telemedicine consultation, Army Knowledge Online, embedded training).

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SECTION D: SYSTEM DESCRIPTIONS

1. JOINT TACTICAL RADIO SYSTEM (JTRS)

MISSION

The Joint Tactical Radio System (JTRS) is a family of high-capacity, software-programmable, multi-band/multi-mode capable, networkable radios that will provide simultaneous voice, data, and video communications. The JTR System will support the joint/mission and joint mission tasks listed in CJCSM 3500.04B, Universal Joint Task List, and service specific planning guidance, that require information exchanges using radio frequency transmissions. This system provides the functionality and flexibility necessary to achieve and maintain information superiority or to support the rapid mobility required by today's armed forces. It also lays the foundation for achieving network connectivity across the frequency spectrum and provides the means for digital information exchanges, both vertically and horizontally, between Joint warfighting elements.

DESCRIPTION AND SPECIFICATIONS

The JTRS provides LOS communications with routing. It is a software programmable radio that is capable of high data throughput rates per channel and is scaleable to operate on simultaneous channels and waveforms. The software allows for self-organizing and able automatic reconfiguration to adjust to changing circumstances (e.g., correcting faults, isolating intrusions, and etc.). It can be reconfigured to a different waveform in a matter of seconds. Legacy Army, Navy, and AF waveforms are available, as well as the objective force waveforms and commercial waveforms (i.e. 3rd and 4th Generation PCS), simply by downloading a small piece of code (like an applet) to reconfigure radio. Hardware suite is compatible with narrowband and wideband operation. Tailored suites of hardware for RF radiation are available for LPI/LPD, optimum operation in certain frequency windows (Low - VHF, Mid -UHF, and High -mm wave), high gain antennas, body armor antennas, as well as antennas on a mast type configuration. Messages will be routed fragmentally where instead of using a single link from one radio to another for a full message; multiple links are used to transmit units of a single message or file. This results in the appearance of very high bandwidth to the user. The radio can perform routing functions (or relay in some sense) for the terrestrial network. In LPI/LPD configuration, the radio will seek out frequencies for transmission that are not being utilized. It will seek bandwidth for use for fractions of a second by selecting frequencies of opportunity (e.g., 10 KHz from one band, 20 KHz from another, etc.).

Cluster 1- ground and helicopter

Cluster 2- Handheld/ Manpack

Cluster 3- Maritime/ Fixed Sites

Cluster 4- Airborne

Cluster 5- Embedded

Data Rates	Frequency	Range	Comments
Up to 10 Mbps	2 MHz – 2 GHz	LOS	Specifics are waveform dependent

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 1 (Ground/Helicopter)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 1 is applied to the ground domain and follows the main JTRS program which provides high-capacity, programmable, multi-band/multi-mode tactical radios for both line-of-sight and beyond-line-of-sight communication capabilities to the warfighter. Cluster 1 operates in the ground mobile environment and provides users with access to the Joint networks. The JTR System ground domain family includes hand-held, dismounted and vehicular applications. Cluster 1 is primarily used in Army ground vehicles, Army rotary-wing aircraft, in ground vehicles employed by Air Force Tactical Air Control Parties, and US Marine Corps applications.

DESCRIPTION AND SPECIFICATIONS

- Multi-band/multi-mode software programmable radio capable of simultaneous voice, data and video operation.
- Enables Voice, Data, Video: TOC-to-TOC data communications and connectivity between Army aviation and lower TI.
- Scaleable to operate 8 channels simultaneously.
- Supports commercial IP routing, BFA systems and multi independent levels of security.
- Capable of automatic network reconfiguration and cross-banding.
- Has open systems architecture and is JTA compliant.
- Supported waveforms include: SINCGARS, EPLRS, DAMA, HF SSB, HAVE QUICK, LINK 16, VHF ATC, Wideband Networking Waveform (WNW); Ref. JTRS JORD.
- Also includes GPS.

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 2 (Handheld/Manpack)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 2 is part of the ground domain but gives the dismounted PCS services. It follows the basic JTRS program and provides high-capacity, programmable, multi-band/multi-mode tactical radios in a handheld and individually worn (manpack-able) unit, to provide both line-of-sight and beyond-line-of-sight communication capabilities. Cluster 2 is primarily used by dismounted personnel.

DESCRIPTION AND SPECIFICATIONS

- Cluster 2 units can be re-programmed by the user in an operational environment.
- Scaleable to operate 3 channels simultaneously for Handheld and 4 channels simultaneously for Dismounted.
- Provides the user with current location data in either GPS or MGRS.
- Supported waveforms include: SINCGARS, EPLRS, HQ II, UHF SATCOM, UHF AM, UHF/VHF FM LMR, VHF AM/FM, WNW, STANAG, SATURN, Link 11 and Link 16 (Ref. JTRS JORD, Ground Domain Annex).
- Handheld unit weights 1lb.; dismounted unit weighs 6 lbs.
- Embedded programmable COMSEC

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 3 (Maritime/Fixed-site)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 3 is a high-capacity, programmable, multi-band/multi-mode tactical radio to provide both line of sight and beyond-line-of-sight communication capabilities. Cluster 3 is used in maritime platforms (ships, submarines) and in fixed sites. The JTR System components will operate on surface and sub-surface platforms that support the mission areas. The maritime JTR Sets shall be interoperable with the Automated RF Distribution System – Maritime, Submarine Antenna Distribution System, Radio Frequency Distribution and Control System (RFDACS), the Automated Digital Network System and the Dynamic Channel Resource Manager.

DESCRIPTION AND SPECIFICATIONS

- The Cluster 3 JTRS is a digital, modular, software, multi function and multi band (2MHz – 2 GHz) radio.
- Scaleable to operate 10 channels simultaneously.
- 12 Waveforms supported include: SINCGARS, HQ II, EPLRS, UHF SATCOM, WNW, STANAG, SATURN, Link 11 and Link 16 (for further list refer to JTRS JORD, Maritime/ Fixed-site Annex).
- It is 19" wide, rack mountable and has embedded COMSEC.
- Will ultimately replace all legacy systems, but is interoperable and backwards compatible with all legacy systems.
- Meets JTRS JORD Maritime/Fixed Site Annex
- Each Maritime and Fixed station configuration of JTR Sets shall provide the capability for radios to be operated, controlled, and monitored from remote locations

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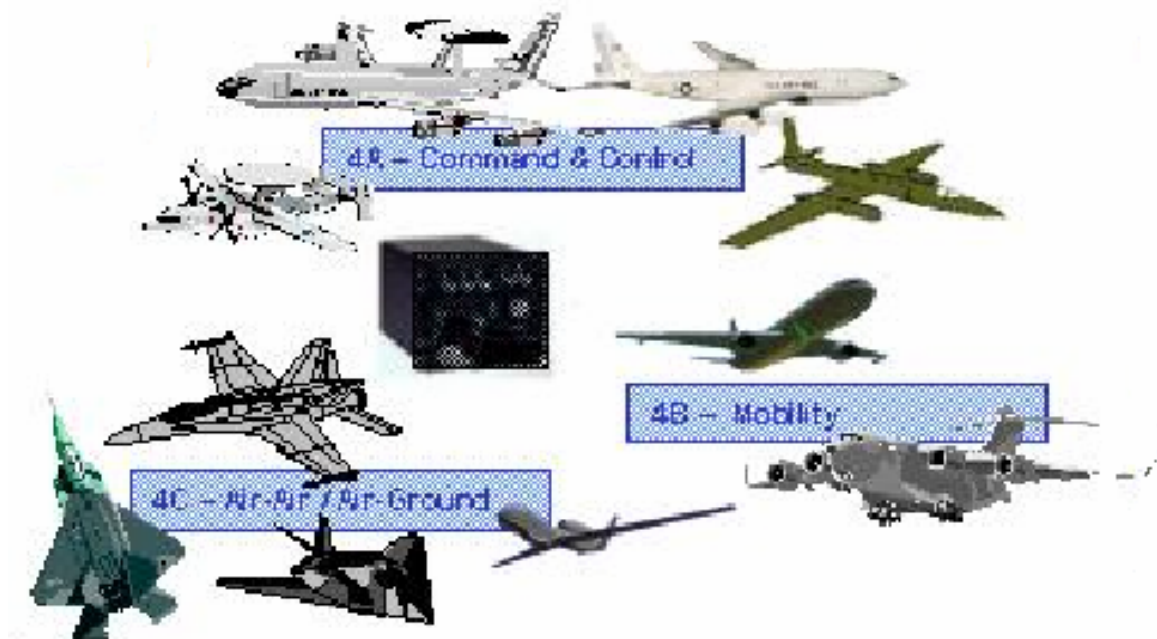
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FOREIGN MILITARY SALES

Unknown at this time

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 4 (Airborne)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 4 is a high-capacity, programmable, multi-band/multi-mode tactical radio to provide both line of sight and beyond-line-of-sight communication capabilities. Cluster 4 is used on the following aircraft to support all mission areas; C2 aircraft, tactical fighter aircraft, Unmanned Airborne Vehicles (UAV), strategic mobility aircraft, and rotary aircraft. The airborne JTR Sets shall meet required performance parameters when integrated into land and sea based, rotary wing, and unmanned aircraft

DESCRIPTION AND SPECIFICATIONS

- The Cluster 4 JTRS is a digital, modular, software, multi function and multi band (2 MHz – 2 GHz) radio.
- Scaleable to operate 10 channels simultaneously.
- Waveforms supported include: SINCGARS, HQ II, EPLRS, UHF SATCOM, WNW, STANAG, SATURN, Link 11 and Link 16; (for a further list refer to JTRS JORD, Airborne Annex.)
- Meets the JTRS JORD Airborne Annex requirements.
- Standard rack mountable and has embedded COMSEC.
- Replaces all legacy systems, and is interoperable and backwards compatible with all legacy systems.
- Sets provide interfaces to existing aircraft peripheral equipment including: visual displays, remote control devices, and night vision goggle
- Provides GPS

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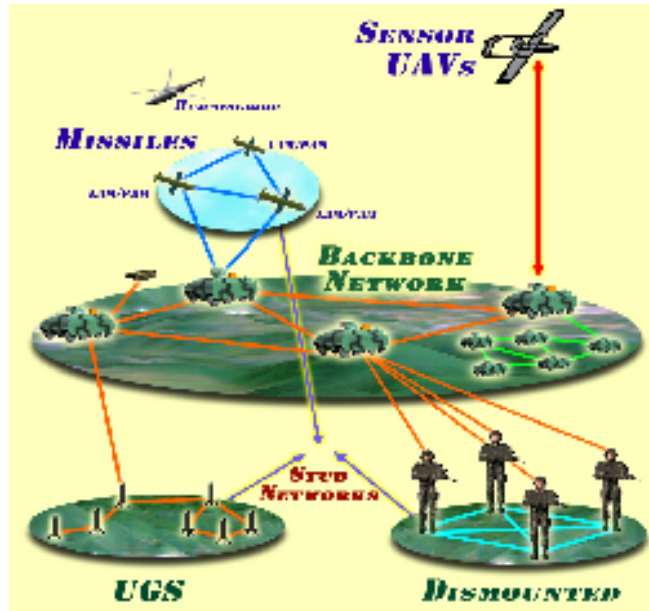
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FOREIGN MILITARY SALES

Unknown at this time

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 5 (X)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 5 (X) is an embedded system. It follows the general JTRS program to be high-capacity, programmable, multi-band/multi-mode tactical radio to provide both line of sight and beyond-line-of-sight communication capabilities for the Objective Force warfighter. Cluster X (or Embedded Cluster) supports dismounted, sensor networks, robotic platforms, munitions, and other special purpose applications.

DESCRIPTION AND SPECIFICATIONS

- Designed as modular, embedded form factor to be integrated into a variety of platforms and special applications:

- Backbone network (imagery, data, voice)
- video distribution
- sensor networks; including ground unattended and UAVs
- robotic platforms
- SMART munitions
- NETFIRES

- Cluster 5 focuses on Army FCS network of networks specific requirements

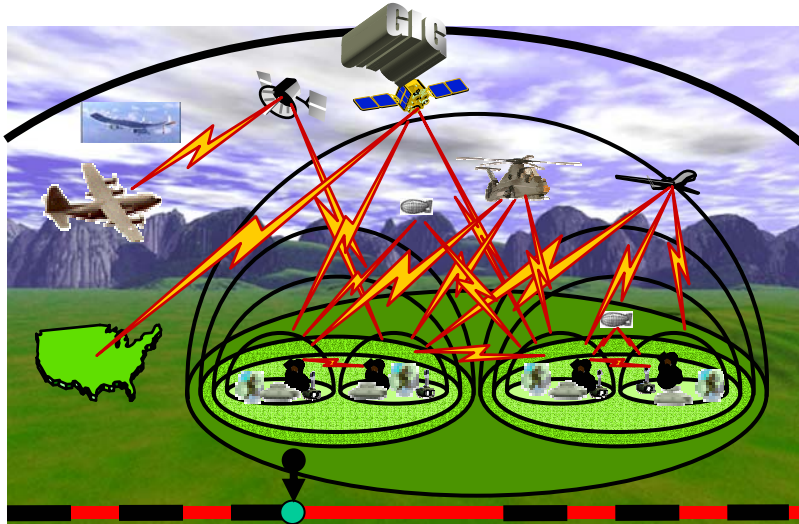
FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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2. WARFIGHTER INFORMATION NETWORK – TACTICAL (WIN-T), OVERVIEW MISSION

WIN-T is the Army's Objective Force (OF) integrated, tactical digital communications network – it is the OF high-speed and high-capacity backbone and communications network. It is optimized for offensive and joint operations, while providing the Combatant Commanders the capability to perform multiple missions simultaneously. WIN-T sets the standards and protocols for OF infospheres while interfacing with/replacing equipment in the legacy and interim forces. WIN-T, as a key component of the GIG, is an information environment comprised of several interoperable computing and communication components. WIN-T facilitates information flow from the Units of Action through the Units of Employment levels and to legacy, interim, Joint, Allied and Coalition forces, and National and Interagency assets. WIN-T is an OF enabler for maneuver, maneuver support and maneuver sustainment elements that support the mission areas of The Army Plan (TAP) for Fiscal Years 2000 – 2015.

DESCRIPTION AND SPECIFICATIONS

The WIN-T network allows Army commanders at all echelons, and other communications network users, to exchange information internal and external to the theater, from wired or wireless telephones, computers (internet like capability) or from video terminals. It is Joint Technical Architecture (JTA) compliant and commercial standards-based network capable of easy upgrades by enabling insertion. WIN-T connects all users from theater to the maneuver battalion, to joint and multinational elements, and to the Global Information Grid (GIG) allowing worldwide connectivity. WIN-T employs a combination of terrestrial, airborne, and satellite-based transport options providing robust connectivity. WIN-T information services help achieve information superiority by providing the necessary communications capabilities to support situational awareness, collaborative planning, dominant maneuver, precision engagement and focused logistics. WIN-T's infrastructure provides commanders and other users, the ability to communicate via voice, data, and video simultaneously at multiple levels of security up to Top Secret/Sensitive Compartmented Information. WIN-T supports the warfighter's requirement for Command and Control On-the-Move (C2OTM) by integrating the major WIN-T elements into warfighter mobile tactical operations center (TOC) platforms while leveraging the Joint Tactical Radio System (JTRS), wide-band digital radios, and wireless local area network (LAN) technologies. This system is a core communications capability (e.g., reach and network operations) that satisfies FCS capabilities. Following pages are a summary of the capabilities offered by WIN-T system.

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

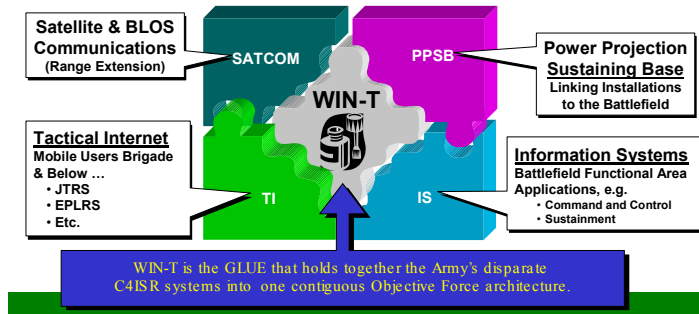
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The OF Network of Networks...

WIN-T is the Army's Single Integrating Framework comprised of:

- Commercially based, state of the art, networked communications systems
- Increased network capacity and speed of service
- Integrated information systems, security & services
- Sustaining base to mobile users/sensor



Warfighter Information Network – Tactical (WIN-T) Description Continued:

DESCRIPTION AND SPECIFICATIONS

Upgrading the WIN-T capabilities is accomplished through a series of “Block” modifications. We are currently fielding Block II. Block III will be applied in 2016. Following is a summary of the most significant aspects that have not been mentioned in previous pages:

Network Availability: 0.98 for Fixed environment and 0.93 for Mobile environment.

Information Dissemination:

- IDM capability to maximize the flow of relevant information to the user, consistent w/users information requirements, the commander's policy, & available resources.
- Ability to dynamically adjust information dissemination policies.
- Provide information management tasks related to transmission & dissemination of information.

Security & Network Protection: Protect and defend against known external threats for 98% of all attacks. If network is compromised, provides tools that identify the impact & restore network services to normal functions.

Mobile Throughput: Move “cross-country” at 35 mph/512 mbs

Modularity: Modular design is scalable, tailorable & adaptive to mission task & purpose w/a common set of protocols & standards; keeps pace w/commercial technology growth through technical insertion.

Information Assurance:

- Automatically adapt to create Information Immune System (IIS); interoperate with Army PKI; support all classifications of information, Multiple Security Levels.
- Implement s & complies with DoD IA Vulnerability Alert Policy.

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Warfighter Information Network – Tactical (WIN-T) (continued)

Network Services:

- Provide Quality of Service for info IAW its priority/precedence 99% of the time.
- Secure wireless personal communications devices capabilities include position information, broadcast, imagery and video throughout battlespace
- UE users and Units of Action freely move within command centers and planning areas to access collaborative tools.
- Timely vital information tailored to unit task and purpose.
- Call forwarding; conferencing; call transfer; call waiting; speed dial; direct access service; line hint groups; redial & caller ID; enable UA users w/voice services for discrete & conference call capability leveraging the JTRS.
- Enable information to move for fusion & integration of intelligence/combat information; info originates from all organic & supporting ISR systems, combat support, combat service support multi-functional sensor suites & national to tactical databases; improved situational awareness & dissemination of priority information to the lowest level.
- Capability for secure and non-secure video.

Survivability:

- minimize detection from ground elements, for mounted operations at 900 meters and dismounted operation at 200 meters; antennas automatically conform to minimize signal interference.
- Accept & transport information from advanced technology systems (e.g. passive radar) for IFF tagging.
- Reduce footprint & increased mobility by an overall reduction in size, weight, manning & logistical support when compared to Interim & Legacy forces.

Network Management:

- OF sensors linked in enhanced C2 framework. Info fused w/other friendly information (National, Allied, Coalition & Enterprise) and distributed as COP to commanders and staff throughout the CINC AOR.
- Automatically adjust network resources (e.g predictive management).
- Enables network manager to plan and assess alternate network deployments, rehearse network movement & performance & plan for network contingencies.
- Interfaces with the Joint and Army Common Databases to exchange data elements that support display of the signal portion of the COP.

Dynamic Spectrum Management:

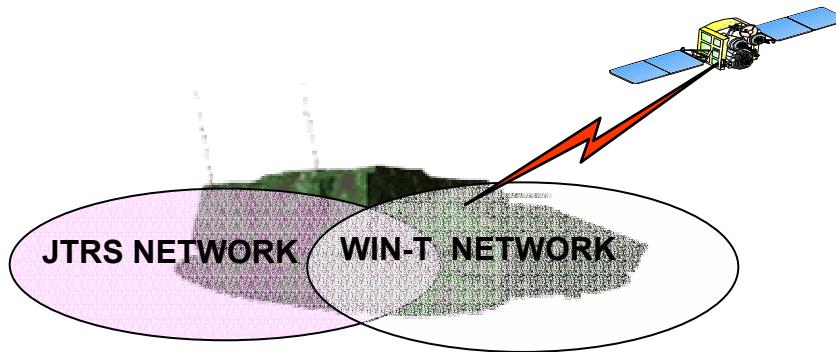
- Capability to de-conflict communications & non-communications emitters.
- Support host nation frequency clearance, landing rights & international law; take advantage of potential legalization of secondary use of spectrum.

Knowledge Mgmt: Provides responsive access for critical information to link AKO capability to the OF.

Network Operations:

- Supports enroute network planning while deploying on strategic lift assets.
- Supports installation of software upgrades, testing and verification of system configuration.

DRAFT



C2V- WIN-T Points of Presence (PoP)

MISSION

WIN-T PoP provides integrated, embedded, connectivity between JTRS and WIN-T Networks with Wideband SATCOM capability. This capability acts as a gateway for the UA and is necessary for global reach connectivity. There are two PoP in each UA Battalion to allow for On-The-Move communications.

DESCRIPTION AND SPECIFICATIONS

WIN-T PoP are embedded in UA ground platforms to provide BLOS capabilities. The capability allows the UA to communicate in the JTRS (lower tactical internet) and WIN-T networks. It also provides a wideband capability. There are two for each UA Battalion to allow for redundancy in the two networks. It acts as a gateway for the UA. This capability provides an overarching and integrating communications network, leveraging JTRS, to enable soldiers to conduct mobile communications while maintaining contact with units in the UE infosphere.

FOREIGN COUNTERPART

Unknown at this time.

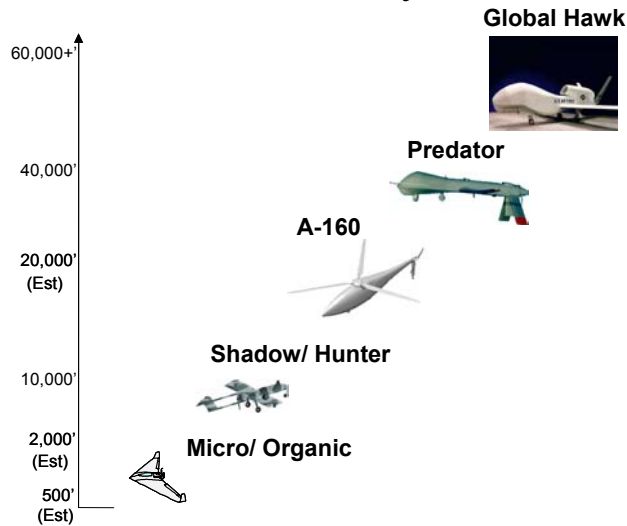
FOREIGN MILITARY SALES

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Airborne Layer Outlook



Section D.3. AIRBORNE ASSETS OVERVIEW

MISSION

Airborne assets' missions are multi-functional in nature and are important to achieve information superiority. It will be a Commander's decision on what mission these multi-functional platforms fly; C4 or ISR. In this section, we are only addressing assets that fulfill a communications mission. Communications missions provide the range and network extension, continuous high data information transport services, and immediate connectivity within the AO. High Altitude Platforms (above 60,000 feet) can take the burden off of the satellites, provide faster communications services, and connectivity to the GIG within its footprint. Airborne assets are multi-tiered and provide a variety of functions depending on payloads and altitude. The tiers are tactical (up to 15,000 feet and small area network), operational (up to 40,000 feet and medium area network), and strategic (high altitude and wide-area network). These assets allow the network to expand and contract as necessary to keep up with the battle. **There are only 6 Global Hawks UAVs dedicated to communications in the military inventory.**

DESCRIPTION AND SPECIFICATIONS

Army has a family of UAVs from backpack portable UAVs, for squad missions and special operations forces, to vehicle launched UAVs for longer-range. All platforms are multi-functional mission oriented, except for the Global Hawks mentioned above. Individual payload and platform descriptions are on subsequent pages.

Platforms

- Global Hawk- Strategic
- High Altitude Airship (HAA)- Strategic
- A160- Strategic/ Operational/ Tactical
- Predator- Operational
- Extended Range/ Multi-Purpose UAV- Tactical
- Shadow/ Hunter- Tactical
- Micro/ Organic UAV- Tactical

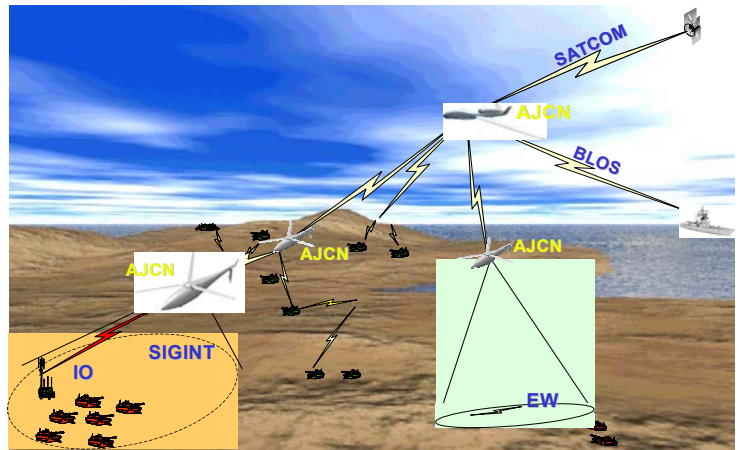
FOREIGN COUNTERPART

Hunter is an Israeli multi-role short-range UAV system in service with the US Army. US appears to be the only country using the UAV for communications missions.

FOREIGN MILITARY SALES

Hunter systems have been sold to France, Turkey, and Belgium.

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ADAPTIVE JOINT C4ISR NODE (AJCN)

MISSION

An airborne multi-mission RF system that provides seamless interoperable communications, signal intelligence (SIGINT), electronic and information capabilities. A single box provides multiple simultaneous functions. It is employed on a variety of platforms to form a theater-wide area networked constellation. The network enables interoperability among the Services and coalition partners, reduces reliance on high demand/low density assets (e.g., Rivet Joint and SATCOM), improves timeliness in responding to emerging requirements/threats and disseminating intelligence collection, increases fidelity in battlespace picture and broad situational awareness, significantly increase access for conducting computer network attack (CNA), and reduce logistics burden through common hardware. It also rapidly provides/augments communications infrastructure and connectivity into the GIG.

DESCRIPTION AND SPECIFICATIONS

AJCN is a multi-functional, re-configurable, modular aerial platform payload. **AJCN payload currently is carried on two different airframes;** Global Hawk providing Strategic connectivity, and A-160 providing Operational connectivity. Its primary function is the relay of multiple types of communications waveforms. AJCN also has the capability to perform signals intelligence, information warfare and electronic attack missions simultaneously. The AJCN is Joint Tactical Radio System (JTRS) compliant and will host JTRS software waveforms. This payload also provides; Advanced Networking Techniques for Multi-Tiered, Highly Mobile Wireless Networks, BLOS Connectivity, Relief of SATCOM Oversubscription, and Early Entry / Rapid Insertion.

COMMUNICATIONS QUANTITATIVE METRICS

- Max user data throughput (kbps)- 3800
- Wideband waveform range (km)- 50
- Number of supported waveforms- 12
- Payload Weight (lbs)- 200
- Jam selected signals
- 8 Networks do not interfere with each other
- Power output sufficient to communicate from 30,000 feet

Platforms

Global Hawk
HAA
A160

AREA COVERAGE- FOOTPRINT

65,000 altitude= 209 miles diameter
25,000 altitude= 86 miles diameter
12,000 altitude= 35 miles diameter

POINTS OF SERVICE

32 Transmitters & receive channels
255 dismounted users per net
5,000 kw for 32 transmitter channels
You can focus beams

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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GLOBAL HAWK HIGH ALTITUDE, LONG-ENDURANCE UNMANNED AERIAL VEHICLE

MISSION

The Global Hawk High Altitude, Long-Endurance Unmanned Aerial Vehicle (HAE UAV) is a National Joint asset that provides CINCs and MACOM commanders with near-real-time, high-resolution, intelligence, surveillance and reconnaissance imagery and battlefield communications capability via a modular, scaleable communications payload. Intended for missions requiring long-range deployment and wide-area surveillance and communications network. Directly deployable from CONUS to the theater of operations. These platforms are owned and maintained by the USAF.

DESCRIPTION AND SPECIFICATIONS

For communications payload description and specifications refer to preceding page on AJCN.

PLATFORM OPERATIONAL CHARACTERISTICS:

- Payload: 1,960 lb
- Altitude: Maximum 65,000 feet
- Range: 3,000 nautical miles
- Speed: Maximum >345 kts
Loiter 345 kts
- Endurance: 42 hrs
- On Station: 48 hours-- if deployed from CONUS

Altitude (Feet)	Ground Elevation Angle				
	0°	10°	20°	30°	40°
25000	31.1	42	21	13	9
35000	36.8	59	29	18	13
45000	41.7	75	37	24	16
55000	46.1	91	45	29	20
65000	50.1	107	54	34	23
80000	55.6	130	66	42	29
90000	58.9	145	74	47	32
100000	62.1	160	82	52	36
110000	65.1	175	90	57	40

FOREIGN COUNTERPART

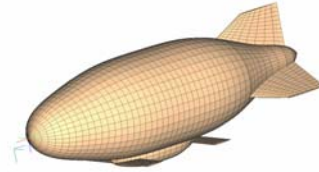
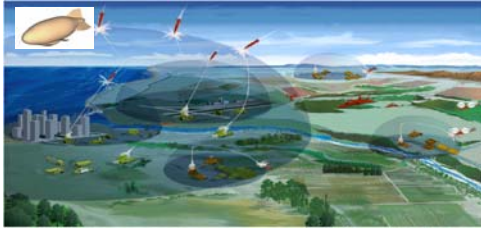
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FOREIGN MILITARY SALES

Unknown at this time

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HIGH ALTITUDE AIRSHIP (HAA)

MISSION

The HAA provides a continuous geo-stationary communications and sensor platform that can hover over most areas of the world. Integrating communications and sensor systems on this objective platform provides an inexpensive alternative to aircraft, UAVs, and satellites. This very long endurance heavy lift platform helps satisfy Combatant Commanders Integrated Priority List items related to Theater Missile Defense/Cruise Missile Defense (TMD/CMD), Command & Control, Communications, Computers, and Intelligence (C4I), and Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA). Operational concept includes launch and recovery from a fixed location in CONUS and airship command and control from SMDC facilities (no forward based logistics burden). Multiple flight operations can be conducted. The operational user unit is the U.S. Army Space and Missile Defense Command (ARSPACE and SMDC). For more platform detail, contact SMDC.

DESCRIPTION AND SPECIFICATIONS

A full scale HAA remains on station up to one year without a logistical footprint in the operational theater other than flight and payload control and operation. It also provides all-weather 24/7 operational capability. Platform is capable of carrying the AJCN C4 payload. The HAA provides intra-theater communications relay to reduce reliance on expensive and hard to get broadband satellite communications.

Performance Characteristics

Altitude:	Maximum 70,000 feet
Endurance:	Can fly unattended for over a year
Coverage Area:	Extends horizon 325 miles
Length:	550 feet
Width:	150 feet
Payload:	6,000 lbs
Fuel:	Solar powered
Flight Control:	Untethered, Remote control (within theater or fixed location in CONUS)
Payload Control:	Remote control (from within theater using Distributed Common Ground System (DCGS))-- refer to SMDC for further details on DCGS)
On Station:	2 weeks from notice-- flies at 30 knots

FOREIGN COUNTERPART

Unknown at this time.

FOREIGN MILITARY SALES

Unknown at this time

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PREDATOR MEDIUM ALTITUDE ENDURANCE (MAE) UAV

MISSION

The Predator MAE UAV provides long-range, long-dwell, near real time communications relay and/or imagery intelligence (IMINT) to satisfy reconnaissance, surveillance and target acquisition (RSTA) and communications mission requirements for the Joint Task Force and Theater commanders.

DESCRIPTION AND SPECIFICATIONS

The Predator's communications relay payload and gateway provides expansion of line-of-sight (LOS) networks to beyond line-of-sight (BLOS) operations, providing voice, video and data to disparate battlefield units. This includes PCS area coverage, direct link high data rate bent pipe connection, airborne switching and aerial crosslinks between TUAVs and up to UAVs, AAVs or satellites. Communications are capable of simultaneous RF and Laser

OPERATIONAL CHARACTERISTICS:

- Payload: 450 lb
- Altitude: Maximum 25,000'
- Operating 15,000'
- Range: 500 nautical miles
- Speed: Maximum 110-115 kts
- Cruise 60-65 kts
- Loiter 65-70 kts
- Endurance: >20 hrs
- Conventional launch and recovery: approximately 2000 ft
- Weight fully loaded: <2300 lbs
- Wingspan: 48.7 feet
- Runway: 5,000 feet by 125 feet

DATA LINK(S):

Type:

- C-band/LOS
- UHF/MILSATCOM
- Ku-band/SATCOM

Bandwidth (Hz):

- C-band/LOS: 20 MHz
- UHF/MILSATCOM: 25 kHz
- Ku-band/SATCOM: 5 MHz

Data Rate(bps):

- C-band/LOS: 20 MHz Analog
- UHF/MILSATCOM: 4.8 kbps
- Ku-band/ SATCOM: 1.544 Mbps

C2 LINK(S):

- UHF/MILSATCOM

FOREIGN COUNTERPART

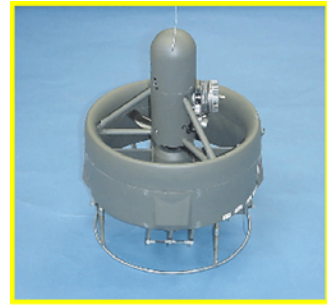
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FOREIGN MILITARY SALES

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MICRO/ ORGANIC AIR VEHICLES (MAV) (OAV)

MISSION

These are a family of Micro/ Organic-Air Vehicles (MAVs) that are envisioned as assets at the Company level or below. They are locally owned and operated. Small AVs give the individual soldier on-demand information about his surroundings, resulting in unprecedented situational awareness and greater effectiveness. These systems are capable of a wide range of missions; such as small unit reconnaissance and surveillance and communications relay. The resulting capability should be especially beneficial in the emerging urban warfighting environment, characterized by its complex topologies, confined spaces and areas (often internal to buildings), and high civilian concentrations.

DESCRIPTION AND SPECIFICATIONS

These aerial robots are fully functional, militarily capable, small flight vehicles in a class of their own. These systems are produced with micro fabrication techniques. They are launched and operated with an easy-to-operate ground station. They could be launched from the ground, overhead flight vehicles, or barrel-launched munitions. As pictured below; situational awareness can be sent to a handheld device.

MAV CHARACTERISTICS

Endurance: 20-60 minutes
Coverage Area: 10 km
Size: 15cm
Fuel: high density sources of propulsion
Flight Control: Remote control
Payload: 20 grams/ single function
Speed: 22-45 mph
Take Off:

OAV CHARACTERISTICS

up to 60 minutes
10 km
24 inches
Lithium-Ion Battery
Autonomous/ Remote control
60 grams/ single function
10-50 knots/hr
Vertical



FOREIGN COUNTERPART

Unknown at this time.

FOREIGN MILITARY SALES

Unknown at this time

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Extended Range / Multi-Purpose TUAV (Equipped with Communications Relay Payload (CRP) Heavy)

MISSION

The Extended Range / Multi-Purpose TUAV (ER / MP TUAV) equipped with a CRP Heavy is controlled at the Corps and Division levels to enhance situational understanding, support tactical deep operations, shape decisive operations, perform scout and reconnaissance missions, perform chemical and mine detection, and support targeting and attack operations provide an extended range, VHF/UHF beyond line of sight relay for battlefield communications (to include helicopter operations) and remote sensor data.

DESCRIPTION AND SPECIFICATIONS

ER / MP TUAV:

- Mission Range – 200-300 km
- Endurance – 8 (+) hrs;
- NLOS operations

ER / MP Payloads:

- CPR Heavy dedicated 24/7; Compliments CPR on Shadow 200
- Airborne Communications Node (ACN)
- WIN-T and JTRS extension
- Range extension of the Tactical Internet (TI)
- 2 TOC-to-TOC nets
- HCLOS extension
- UHF SATCOM
- Link 16
- CDMA/PCS
- Payloads controlled remotely
- Cross-linking and Cross-banding
- Network Management Module
- Dedicated 24/7 to Division Commander

FOREIGN COUNTERPART

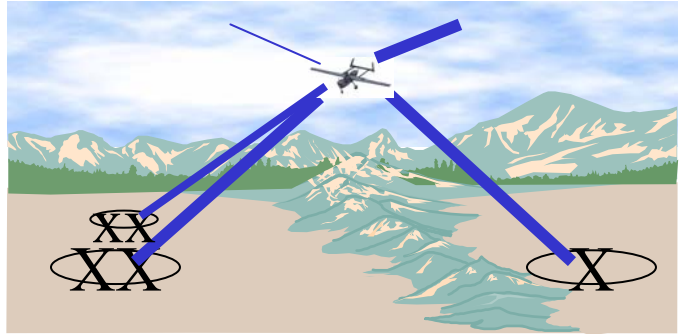
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FOREIGN MILITARY SALES

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FCS Unmanned Aerial Vehicle – Class III (UAV (CL III)) (Shadow 600 airframe)

MISSION

The FCS UAV CL III shapes, influences and supports operations at the tactical level. It is a multifunction aerial system capable of providing reconnaissance, security/early warning, target acquisition and designation for precision fires, throughout the battalion area of influence by remotely over watching and reporting changes in key terrain, avenues of approach and danger areas in open and rolling, restrictive and urban areas. The FCS UAV (CL III) utilizes the Shadow 600 airframe. The FCS **UAV (CL III) provides communications relay**, mine detection, CBRN detection and meteorological survey for the NLOS battalion to deliver precision fires. It supports the CA Battalion by performing R&S on a minimum of three routes or nine NALs. There are 3 systems for each CA Battalion and 3 systems in the NLOS Battalion.

DESCRIPTION AND SPECIFICATIONS

The FCS UAV (CL III) provides a mission time of 10 hrs time on station at 40 km area of influence, at an altitude between 1,000 and 2,000 feet. It can be launched, recovered and operated in crosswinds from 20-30 knots, all without the need for a supporting airstrip. It can operate in moderate precipitation conditions, up to 1.0 inches per hour.

Airframe Performance Characteristics:

Maximum Altitude: 16,000 ft
Gross Weight: 583 lbs
Maximum Payload Weight: 90.2 lbs
Endurance: 12 to 14 hrs
Cruise Speed: 75 kts
Maximum Dash Speed: 104 kts

Radio to Platform Mapping:

<u>Source</u>	<u>Product:</u>
Cluster 1	SDR (8 channel)
Cluster X	SDR (2channel)
FCS-C	Networked Data Link

Command and Control (C2) Capabilities:

C2 OTM (MOSAIC)
CROP; EMPRCS
LDSS; Data Fusion (full)

Communications Capabilities:

Soldier Radio; JTRS (full)
OTM Tactical SATCOM (full)

Waveform Loads:

JTRS (8 channel) – WNW; SINCGARS; EPLRS;
SUO-D; MUOS
SDR (2 channel) – WNW; SUO-D

FOREIGN COUNTERPART

Unknown at this time.

FOREIGN MILITARY SALES

Unknown at this time

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FCS Unmanned Aerial Vehicle – Class IVa (UAV (CL IVa)) (A160 Hummingbird Warrior airframe)

MISSION

The FCS UAV CL IVa shapes, influences and supports the battlespace at the Brigade level. The UAV (CL IVa) performs as a communications (comms) relay and emitter mapping, detects CBRN, and performs meteorological survey for the UA throughout the Brigade's area of influence. The UAV (CL IVa) utilizes the A160 Hummingbird Warrior airframe and is a vertical take off and landing (VTOL) platform. The UAV (CL IV) enables detection of soldiers and vehicles (moving and stationary) through foliage. Provides RSTA products to the UA through common data links or the network via the FCS Battle Command System.

DESCRIPTION AND SPECIFICATIONS

The UAV (CL IVa) can be launched, recovered on an unprepared surface and operated in crosswinds from 20-30 knots and operate in adverse weather conditions. It can operate in high/hot, 4000 ft pressure altitude, at 95°F conditions and also in cold climatic conditions. The UAV (CL IVa) can be sling loaded by CH-47.

Airframe Performance Characteristics:

Maximum Altitude: 55,000 ft

Cruising Altitude: 15,000 ft

Gross Weight: 4,000 lbs

Payload: 450 lbs

Endurance: Up to 40 hrs

Range: 3,000 mi

Top Speed: 140 kts

Type of Platform: VTOL

Command and Control (C2) Capabilities:

UAV C2 Relay

C2 OTM (MOSAIC) (+)

CROP (+); EMPRCS

LDSS; Data Fusion (full)

Communications Capabilities:

Soldier Radio; JTRS (full)

OTM Tactical SATCOM (full)

Radio to Platform Mapping:

Source

Product:

Cluster 1

SDR (8 channel)

SDR (4 channel, comm relay)

Cluster X

SDR (1channel, sensor)

FCS-C

Networked Data Link

(comm relay & sensor)

Waveform Loads:

JTRS (8 channel) – WNW; SINCGARS; EPLRS;
SUO-D; MUOS

JTRS (4 channel, comm relay) – WNW; SUO-D

SDR (1 channel, sensor) – WNW; SUO-D

FOREIGN COUNTERPART

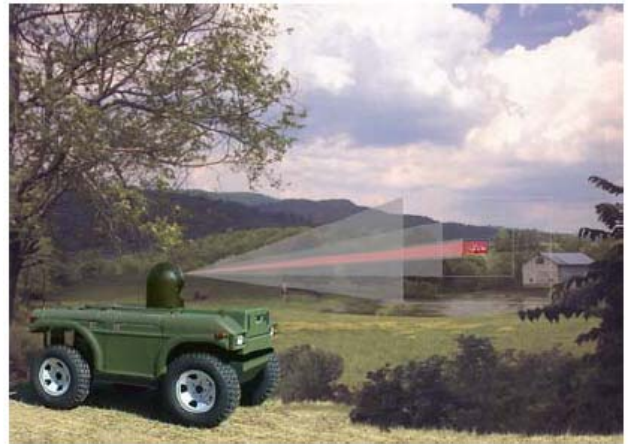
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FOREIGN MILITARY SALES

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Section D.4. Unmanned Ground Vehicles

FCS Unmanned Multi-Function Utility/Logistics and Equipment (MULE) Vehicle – MULE Retrains

MISSION

FCS Unit of Action Dismounted Forces must be self sustaining during continuous operations. Increased endurance and cognitive awareness for soldiers is enhanced by removing functions from their backs and placing them on platforms. Unmanned MULE robotic vehicles provide capabilities on a highly agile, light and survivable platform. This MULE enables the JTRS network to extend over obstacles and to keep the forces connected. Assets are owned and operated by the UA Signal Company.

DESCRIPTION AND SPECIFICATIONS

FCS Unmanned Vehicles provides transport of equipment and/or supplies in support of dismounted maneuver and support and enhance C4ISR capabilities. These multi-functional platform follow Maneuver personnel and systems or are directed to move to positions not along the line of movement. The Unmanned MULE vehicle is equipped with all wheel drive, a hybrid electric drive-diesel engine, in-hub motors and hybrid steering. The relay services provides transportable and scaleable, position location, and networking capabilities. MULE contains multiple cluster 1, vehicular configuration, or cluster5 packages to enable it to perform the retrans function. The smaller platforms contain cluster 5 packages. Can be remotely operated up to 4 kilometers.

Vehicle Performance Characteristics:

- Payload: up to 2,400 lbs
- Range (fully loaded): 100 km on road
- 50 km cross country
- Speed: 90 kph on hard surface roads
- 20 kph on complex terrain
- Transportability: 9 vehicles transportable per C-130
- 1 fully loaded transportable by UH-60

Communications Capabilities:

Refer to JTRS Cluster 1 and 5 description pages for full details

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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Unmanned Ground Vehicle (UGV); WIN-T Remote Node

MISSION

WIN-T provides integrated, embedded, multi-layered high throughput and flexible OTM communications capabilities to the Objective Force. WIN-T Remote Nodes provide Non-Line Of Sight (NLOS)/Beyond Line of Sight (BLOS) communications by leveraging airborne and space based platforms (e.g. surrogate satellite, dedicated communications and dual mission UAVs, aerostat, etc.) to extend the network and support the agility required of the OF. These platforms are organic to the UE Signal Units.

DESCRIPTION AND SPECIFICATIONS

WIN-T Remote Node platforms, are Unmanned Vehicles to extend and enhance communications and C4ISR capabilities and serve as networking nodes. They are positioned by sling loaded; air dropped; ground transportation (both by logistical transportation support or autonomous employment). Transmission relays/terminals (e.g. terrestrial, airborne, BLOS, and space) are used to extend connectivity to stationary and mobile users. As geographically separated elements of users develop, subscriber services may be extended anywhere (e.g. located in buildings, bunkers, etc.). These nodes provide an overarching and integrating communications network, leveraging JTRS, to enable soldiers to conduct mobile communications while maintaining contact with units in the UE infosphere. Wide-band networking radios will provide the primary means to exchange the information requirements of the warfighter. The UGV WIN-T vehicle is equipped with all wheel drive, a hybrid electric drive-diesel engine, in-hub motors and hybrid steering. Can be remotely operated as long as the node is within a satellite footprint or up to 4 kilometers.

Vehicle Performance Characteristics:

- Payload up to 2,400 lbs
- Range (fully loaded): 100 km on road
- 50 km cross country
- Speed: 90 kph on hard surface roads
- 20 kph on complex terrain
- Acceleration: 0-48 kph in 12 sec on level terrain
- Transportability: 9 vehicles transportable C-130
- 1 fully loaded transportable by UH-60

FOREIGN COUNTERPART

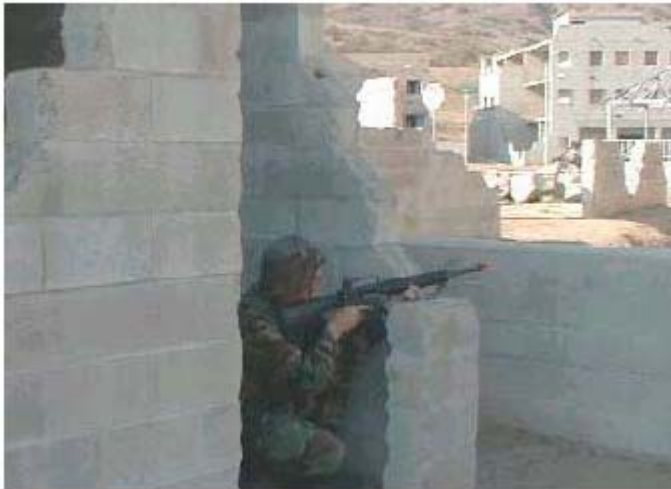
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FOREIGN MILITARY SALES

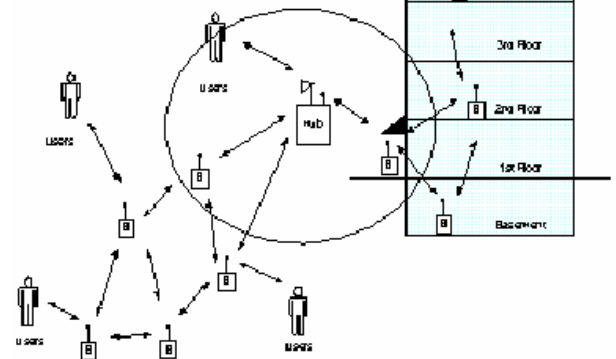
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BreadCrumbs Used to Penetrate Building and Reach beyond Hub Coverage



D.5. Roaming Communications Network-Breadcrumbs

MISSION

The Roaming Communications Network provides secure, wireless, broadband networking for fielded handheld and embedded computing and monitoring devices, instantly deployable anywhere in the mission area. This network operates everywhere the Warfighter goes, including beyond the limitation of radio propagation (ex.: into buildings, dense urban areas, tunnels, hilly terrain, triple canopy jungle) and beyond the distance limitations of a single radio system. Provides reach capability. Own and operated by the individual soldier.

DESCRIPTION AND SPECIFICATIONS

The Roaming Communications Network employs "BreadCrumbs" that inter-network, thereby extending the network beyond normal capabilities. The network creates a path into and around buildings, dense urban areas, tunnels, hilly terrain, triple canopy jungle, etc. and beyond standard 802.11 broadcast distances. The "BreadCrumbs" are lightweight and can be deployed by simply activating and dropping -- "Drop and Walk Deployment". The system's flexibility allows for multiple Hub configurations. A Hub can be configured from a standard laptop for basic connectivity options or can be provisioned with rack mounted computer(s) (in C2 vehicles to run advanced command and control software which insures security, quality of service, video server functionality, routing functionality and administers moves, adds and changes. Advanced wireless broadband systems and components are configured to instantly deploy highly portable, wireless, secure, self-powered for 30 days (objective is solar-power and longer endurance), high bandwidth applications such as streaming video, IP telephony, Internet access, and remote sensing and monitoring. Low cost disposable asset.

SYSTEMS SPECIFICATIONS

Standards: IEEE 802.11b (optimized/ enhanced)

On/Off Switch: One illuminated Rocker

Operating Range:

Indoor (up to): 50 M @ 11.0 Mbps
80 M @ 5.5 Mbps
120 M @ 2.0 Mbps
150 M @ 1.0 Mbps

Outdoor (up to): 250 M @ 11.0 Mbps
350 M @ 5.5 Mbps
400 M @ 2.0 Mbps
500 M @ 1.0 Mbps

FOREIGN COUNTERPART

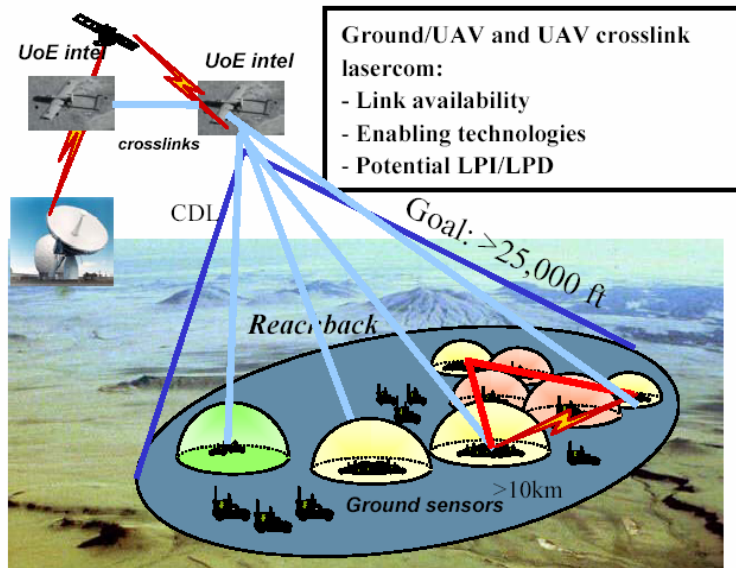
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FOREIGN MILITARY SALES

Unknown at this time

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D.6. Free Space Optical Communication System (FOCUS)

MISSION

FOCUS is a full duplex, on-the-move laser communications system, providing covert, radio silent, extended range communications to support high-capacity multimedia information (voice, video and data) exchange for the Objective Force. FOCUS enables Objective Force Units of Action/Units of Engagement to transmit high bandwidth data with no RF signature from point-to-point static and on-the-move links without the need for fixed installation.

DESCRIPTION AND SPECIFICATIONS

FOCUS emphasizes three major subsystems: signal acquisition and tracking (optical beam steering), adaptive optics receiver correction and systems hardware and network. Fully packaged baseline prototype system is currently available

- Transponder Tracking Approach
 - Peer-to-Peer Tracking System
 - Extended Range with Small Apertures
- Fiber Based Optical System
 - Component Availability
 - High Power Fiber Amplifiers
 - DWDM (Dense Wavelength Division Multiplexing) Techniques Allow Data & Track Signals to Piggyback (protocol independent, network transparency)
 - DWDM provides potential for higher data rates (155 Mbps –1 Gbps)
- Increased Field of Regard
 - Azimuth Gimbal Provides Full Coverage (360 deg azimuth/ +-45 degrees elevation)

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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Section D.7. SPACE ASSETS VISION- Transformational Communications Architecture

1. Future of Space: This is only a snapshot of future SATCOM (Satellite Communications) support based upon current DoD space policies, architecture options, funding streams, technology advancements, joint concepts, and validated requirements. While some developing countries will experience economic growth, the poorest nations will face declining standards of living. The escalation of mass communications and the World Wide Web will convey these differences, leading to political instability in some places. Faster, more accurate and reliable information will be the key in dominating the anticipated high-technology battlefields of the future. However, better technology will not win wars. In the future, potential adversaries will have access to the same technologies that will include displays showing disposition of forces, weather data, navigational tools, imagery, and regional situational awareness. Additionally, they will share and/or compete for commercial satellite communications services. Gaining superiority in space will be tough. US adversaries clearly understand the force multiplication power that space provides.

2. Future of Commercial: The trend will be toward more international consortiums as companies will find that surviving the business world will depend more on outside contributions and broadening business cases and providing services outside of the US. A well financed adversary may also be able to finance their own satellite constellations supported by either the government or other like financial support. Information will be available in very good and useful detail to all who can pay for the services. Info-mercenaries will emerge in full force by 2015. Movement of troops and equipment will be hard to hide.

3. Future of DoD Space: Determining the best mix of owned and leased space capabilities, management and control system, and terminals to provide optimum support to the warfighter within fiscal constraints is tremendously complex. For all practical purposes, all 20th century DoD-owned SATCOM systems will no longer maintain their desired constellation sizes during the first decade of the 21st century. In early 2002, DoD initiated a Transformational Communications Study (TCS) to accelerate the delivery of advanced satellite capabilities and that plan still provides an acceptable SATCOM architectural "roadmap". The three most critical satellite communications features required by the future warfighter are terminal mobility, high capacity, and protected/ survivable links in a threat environment.

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3 a. Architecture overview: The transformational Communications architecture will be an internet-like transport architecture between space, air and ground nodes. It includes the GEO Backbone with other constellations, air platforms, and users tapping in. It ensures the following:

- Integrated and interoperable Space, Air and Ground networks across domains and enclaves
- Global access to deployed/ mobile users
- Timely delivery of air and space data to Theater and CONUS (AISR & SISR support)
- Automatic, dynamic & secure management of network resources
- Increased capacity with a more robust and dynamic RF and laser communications network

b. TC Key Technologies.

- Backbone relay
- MILSATCOM Access Network- Includes airborne high altitude multi-functional terminals acting as high data LOS pseudo-satellite, nulling antenna for mobile users, higher data rate protected RF & flexible bandwidth, information assurance and networking testbed and standards development covering all segments, lasercom crosslinks, multi-access lasercom, network standards and interface.
- Terminals
- Terrestrial Infrastructure- High rate terrestrial networks and ground infrastructure with network standards and interfaces and mobile users with 1 foot tracking antennas (vehicles)

c. TC Services

- Common- Features; Network centric, IP and circuit
- AEHF- Features; protected, strategic survival, crosslink gimbal mods
- Advanced Polar (HIO)- Features; XDR, Strategic survivable, RF & LC X-links to AEHF & TSAT
- TSAT (backbone)- GEO
- MUOS (GEO)
- WGS (GEO)- X, Ka; modified for 274 Mbps AISR

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Section D.8. MILSATCOM Tactical Terminals

Army Tactical Multi-band Satellite Terminal (MIST)

MISSION

The Army Tactical MIST Terminal is a family of tactical satellite terminals providing Satellite Communications On-The-Move (SOTM) capabilities with zero to low probability of interception/ detection, and exploitation. It provides a small footprint and more sustainability to the warfighter. MIST also provides military and commercial connectivity to distant end subscribers including data, imagery, video, and voice communications. It is capable of secure and non-secure communications and is compatible and interoperable with Joint, National, and Coalition C4 systems. Terminals are interoperable with all legacy and planned fieldings of SHF and EHF terminals. Terminals are also able to communicate using military UHF, SHF (X and Ka), and EHF or commercial C, Ku, and Ka frequency bands. MIST also has the ability to function as a signal node with tandem capability, multiple trunk groups, and multiple local subscribers. Can be found at Active Component UE and UA units.

DESCRIPTION AND SPECIFICATIONS

- Modular Design
- Common Hardware
- Multi-band Capable
- Flexible Baseband Interfaces
- Network Centric
- Operates in military environment: Temperature, Shock, vibration
- C-130/C-141/C-17 roll-on/roll-off capable
- Left image above is Communications on the Pause (COTP)- Dedicated Vehicle
 - Wide band communications capability
 - Stationary operation at high data rates
 - Communications On-The-Move (COTM) operations at lower data rates
 - Range extension of Future Warfighter Information Network
 - Protected Communications
- Right image above is COTM Vehicular mounted- No dedicated vehicle (embedded for warfighter)
 - User operation from cab interior OTM
 - OTM communications at lower data rates
 - Global Broadcast Service (GBS) On-the-Move Receive
 - Wireless OTM terrestrial relay via SATCOM

FOREIGN COUNTERPART

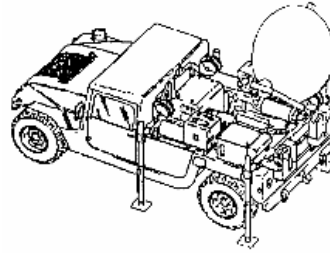
Unknown at this time.

FOREIGN MILITARY SALES

Unknown at this time

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Army Secure Mobile ANTI-JAM Reliable Tactical Terminal (SMART-T)

MISSION

The Army SMART-T provides warfighters at Active Component Stryker Brigades, National Guard divisions and Reserve Component Brigades with secure, jam resistant, extended range, two-way, point-to-point and network voice, data, and video communications reach capability to enable forces to maintain information superiority throughout all levels of conflict, support the full-dimensional protection operational concept, and ensure that warfighters retain freedom of action through continuous, secure communications.

DESCRIPTION AND SPECIFICATIONS

SMART-T is a highly mobile terminal that is fully integrated on a single HMMWV. This EHF terminal that provides unattended, robust, worldwide, low probability of detection, jam resistant, multi-channel communications in support of the field commander and widely dispersed units. A typical application is to provide multichannel range extension of the MSE to units beyond line-of-sight at division and corps. SMART-T will replace the multichannel GMF terminal for hard core and core users. It has the capability to interface and control certain aspects of the satellite such as resource control and antenna pointing. The SMART-T is interoperable with MILSTAR, FLTSAT EHF Packages (FEP), and EHF Packages on UHF Follow-On (UFO) Satellites.

- Multi-service interoperability
- Operates over Milstar I, Milstar II (LDR & MDR), and FEP satellites
- Supports 16Kbps Rate Family up to 1024 Kbps as well as 1544 Kbps Commercial Rate
- AEHF data rate is 8 Mbs
- DAMA for efficient satellite resource utilization
- Provides secure, anti-jam and low probability of intercept/ detection communications
- It provides Low Probability of Intercept/Detection (LPI/D) and has built in Transmission Security (TRANSEC) with Over-The-Air-Rekeying (OTAR) capability.
- Selected SMART-Ts will have embedded FSEN switches.
- Self-erecting/ stowing satellite antenna
- Unmanned Operation after set-up
- A self-contained 1.5 kW diesel generator supplies prime power.
- Terminal can be operated remotely with hand-held (laptop) computer

FOREIGN COUNTERPART

Unknown at this time.

FOREIGN MILITARY SALES

None

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JOINT TACTICAL RADIO SYSTEM (JTRS), CLUSTER 2 (Handheld/Manpack)

MISSION

The Joint Tactical Radio System (JTRS) Cluster 2 is part of the ground domain but gives the dismounted PCS services. It follows the basic JTRS program and provides high-capacity, programmable, multi-band/multi-mode tactical radios in a handheld and individually worn (manpack-able) unit, to provide both line-of-sight and beyond-line-of-sight communication capabilities. Cluster 2 is primarily used by dismounted personnel.

DESCRIPTION AND SPECIFICATIONS

- Cluster 2 units can be re-programmed by the user in an operational environment.
- Scaleable to operate 3 channels simultaneously for Handheld and 4 channels simultaneously for Dismounted.
- Provides the user with current location data in either GPS or MGRS.
- Supported waveforms include: SINCGARS, EPLRS, HQ II, UHF SATCOM, UHF AM, UHF/VHF FM LMR, VHF AM/FM, WNW, STANAG, SATURN, Link 11 and Link 16 (Ref. JTRS JORD, Ground Domain Annex).
- Handheld unit weights 1lb.; dismounted unit weighs 6 lbs.
- Embedded programmable COMSEC

FOREIGN COUNTERPART

Unknown at this time

FOREIGN MILITARY SALES

Unknown at this time

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